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VARIABLE STARS.

By Rose O'Halloran.

In the four-inch Brashear telescope used for the following observations, stars of twelfth magnitude are generally at the limit of visibility, but on exceptionally clear nights the light-gathering power no doubt includes fainter stars, though it is uncertain if those of thirteenth magnitude are within its range. The powers used were from about 40 to 200, according to the condition of the atmosphere.

W Lyræ.

This variable having decreased from the maximum of January, 1902, to 9.4 in the following March, as published in No. 84, *Publications A. S. P.*, has since waned and increased as follows:—

1902.
May 8. Invisible.
27. Invisible.
June 1. Invisible.
2. 11.5 mag.; brighter than *t* of 12th mag.
8. Nearly of 11th mag.
14. Of 11th mag.
16. Of 11th mag.
23. Nearly equal to *g* of 10th mag.
25. Slightly brighter than *g*.
28. Equal to *g*.
July 1. Brighter than *g*, less than *e* of 8.8 mag.
4. Slightly brighter than *e*, less than *a* of 8.6 mag.
7. Equal to *e*.
10. Between *e* and *p*. The latter is 9.4.
15. Between *e* and *p*.
16. *e* is about two-tenths brighter than *W*. On account of these fluctuations, the hour of observation is noted hereafter.
21. 8 50 P. M. Equal to *e*.
22. 8.50 P. M. It is brighter than *e* but less than *a*.
24. 8.30 P. M.
30. 8.55 P. M.
Aug. 1. 8.42 P. M.
More distinctly brighter than *e*, but still less than *a*.
14. 8.15 P. M. After two cloudy weeks, *W* was seen to be brighter than *a* and equal to *n* of 8.1 mag., which is not far from the usual maximum of this variable. Further observation was unavoidably deferred until the constellation reappeared northeast in the morning sky.

Dec. 28. 5.45 A. M. Discernible only in a high power. Probably of 12th mag.
29. 6.10 A. M. 12th mag. This is the date of predicted minimum. The morning is clear.
1903.
Jan. 29. 6.05 A. M. Moonlight and rainy weather hindered observations for some weeks. *W* is two or three tenths brighter than *g*.
Feb. 5. 6.00 A. M. Equal to *p*.
15. 5.35 A. M. Brighter than *p*, not fully equal to *e* It is probably of about 9th mag.
21. 6 00 A. M. Equal to *e*.
28. 5.34 A. M. Equal to *a*. The morning is rather clear.
March 6. 5.45 A. M. Equal to *a*, not equal to *n*.
9. 5.42 A. M. Equal to *a*. It has not yet attained its maximum brightness.

V Orionis.

Jan. 29. Invisible. Night not very clear.
Feb. 1. Barely discernible. Probably of less than 11.5 mag.
12. Barely discernible. Probably of less than 11.5 mag.
25. Invisible.
26. Invisible.
March 3. Invisible.
6. Indiscernible. Half-moon is near. This is the date of predicted minimum.
8. Indiscernible. Moonlight.

S W Cygni (formerly designated *U^3 Cygni,* and sometimes *V^3 Cygni*).

For the sake of uniformity, this miniature of *Algol* has been rechristened, and will be described in future records as *S W Cygni.*

1902.
Jan. 27. 6.00 A. M. Equal to *f* of 9.2 mag.
Feb. 12. 5.45 A. M. Equal to *d* of 9 6 mag.
22. 5.15 A. M. Not fully equal to *a* of 8.6 mag.
May 27. 9.54 P M. Nearly equal to *a*
June 1. 9.30 P. M. Brighter than *o* of 10 9 mag.
2. 9.25 P. M. Nearly equal to *a*.
7. 9 30 P. M.
8. 9.20 P. M.
13. 9.15 P. M. Between *a* and *f*.
14. 9.30 P. M.
16. 9.20 P. M.
24. 9.28 P. M. Of 12th mag.
25. 9.25 P. M. Scarcely more than 12th mag.

June	26.	10.00 P. M.	Nearly equal to *a*.
	28	10.00 P. M.	Still nearer to the brightness of *a*.
July	1.	9.12 P. M.	Between *a* and *f*.
	4.	9.18 P. M.	
	7.	9.05 P. M.	
	9.	9.12 P. M.	
	10.	9.18 P. M.	
	12.	9.13 P. M.	
	16.	9.08 P. M.	
	21.	9.15 P. M.	
	22.	9.00 P. M.	
	29.	8.30 P. M.	
	30.	8.40 P. M.	Nearly as bright as *a*.
	31.	9.30 P. M.	Nearly as bright as *a*.

The continued sameness was rather unusual, but being familiar with the field of view, I feel no uncertainty about it.

Y Virginis.

1902.			
April	10.		It is of about 10th mag.
	13.		Of 9.5 mag.
	24.		Of 9th mag.
May	2.		About 8.8 mag.
	8.		About 8.8 mag.
	11.		Of 9th mag.
	12.		Date of maximum.
	29.	8.35 P. M.	Equals *c* of 9.5 mag.
	30.	8.45 P. M.	Equals *d* of 10.5 mag.
	31.	9.00 P. M.	*d* two tenths brighter than var.
Aug.	1.	9.05 P. M.	*d* two tenths brighter than var.
	2.	9.00 P. M.	Equal to *n* of 10.9 var.
	14.	8.35 P. M.	Probably not far from 12th mag., which is the usual limit of the telescope used.

W Aurigæ.

1902.		
Oct.	28.	Brighter than *a*, less than *c*. Probably of 9.3 mag.
Nov.	1.	Brighter than *a*, less than *c*. Probably of 9.3 mag.
	3.	Equal to *a*.
	11.	Equal to *a*.
	18.	Fainter than *a*, brighter than *k* and *l*, with which it forms a triangle. About 10.5 mag.
	22.	Fainter than *a*, brighter than *k* and *l*.
	26.	Seems nearly equal to *a*.
Dec.	1.	Less than *a*, scarcely brighter than *l* of 11th mag.
	10.	Equal to *k*, classed as 12th mag.
	16.	Invisible. This maximum of October seems to have been unexpected.

S S Cygni.

A brief maximum of this interesting star was observed as follows:—

1902.			
June	2.	9.35 P. M.	Invisible.
	24.	9.23 P. M.	
	25.	9.20 P. M.	
	26.	9.43 P. M.	
	28.	9.20 P. M.	
July	1.	9.15 P. M.	
	4.	9.21 P. M.	About 12th mag.
	7.	9.50 P. M.	
	10.	9.15 P. M.	
	12.	9.15 P. M.	
	13.	9.10 P. M.	
	15.	9.15 P. M.	Equal to *a* of 9.6 mag. Brighter than others, except *b*, in the triangular group around it.
	16.	9.05 P. M.	About two tenths brighter than *a*.
	21.	9.10 P. M.	Equal to *a*. Full moon.
	22.	9.10 P. M.	*a* two tenths brighter than the variable.
	29.	8.35 P. M.	Var. equals *c* of 9.5 mag.
	30.	8.45 P. M.	Var. equals *d* of 10.5 mag.
	31.	9.00 P. M.	*d* two tenths brighter than var.
Aug.	1.	9.05 P. M.	*d* two tenths brighter than var.
	2.	9.00 P. M.	Equal to *n* of 10.9 mag.
	14.	8.35 P. M.	It is about 11.5, or 12th mag.

S Tauri.

The minimum of *S Tauri,* expected on February 10th, occurred somewhat earlier, as at that stage it is invisible in a 4-inch lens.

1903.		
Jan.	29.	About 10.5 mag.
Feb.	1.	10.2 mag. It is slightly increased.
	10.	In moonlight it seems of 10th mag., being equal to the adjacent stars.
	12.	In moonlight it seems of 10th mag.
	19 and 24.	Brighter than 10th, of 9.7 mag.
March	3.	It is of about 9.5 mag.
	6.	About 9.5 mag. Moon near by.
	8.	About 9.5 mag. Moonlight.

R Tauri.

1902. On November 19th, December 1st, 20th, 24th, 27th and 28th, this star was invisible.

1903.
Jan. 29. Of 11th mag. Dimmer than *S Tauri* in the same field of view.
Feb. 1. About 10.2 mag., but dimmer than s.
10. 9.5 mag., brighter than s.
12. Not far from 9th mag.
19. Brighter than 8th, probably 7.8 mag.
24. Brighter than 8th.
March 3. Not so bright, probably of 8th mag.
6. Probably of 8th mag. Half moon near.
8. Probably of 8th mag. Moonlight.

S Ursæ Minoris.

1902. Date of expected maximum, May 9, 1902.
April 8. 9th mag.
9. 9th mag.
19. 8.5 mag.
26. 8th mag.
May 1. 8.5 mag.
8. 8.5 mag.
10. 8.5 mag.
14. 8.5 mag.

T Ursæ Majoris.

1902.
March 30. Equal to *k* of 9th mag.
April 8. About 8.8 mag.
13. Of 8th mag.
19. About two tenths brighter than 8th mag.
26. About two tenths brighter than 8th mag.
May 1. About two tenths brighter than 8th mag. Before the date of maximum brightness, May 21st, it had gone out of view.

PLANETARY PHENOMENA FOR MAY AND JUNE, 1903.

By Malcolm McNeill.

PHASES OF THE MOON, PACIFIC TIME.

First Quarter,	May	3,	$11^h 26^m$ P.M.	First Quarter,	June	2,	$5^h 24^m$ A.M.
Full Moon,	"	11,	5 18 A.M.	Full Moon,	"	9,	7 8 P.M.
Last Quarter,	"	19,	7 18 A.M.	Last Quarter,	"	17,	10 44 P.M.
New Moon,	"	26,	2 50 P.M.	New Moon,	"	24,	10 11 P.M.

The Sun reaches the solstice and summer begins June 22d, 7 A. M., Pacific time.

Mercury presents the best aspect of the year for naked-eye